G2-28489

DEPARTMENT OF ECOLOGY
State of Washington

Water Resources Program

FORM 1 – Measuring Device Information

Please fill out one form for each measuring device.

WATER RIGHT HOLDER(S):	WATER RIGHT DOCUMENT NO(S):
Name(s)	**Certificate, Permit, Claim, or Court Claim**

User's name for diversion/withdrawal point: WELL #1 WOODLANDS ABH327
(ex. Well #1, Blue well house)

ABOUT THE MEASURING DEVICE:

Please include an up-close photo of the face of the meter.

Flow Type: ☐ Open Channel Flow ☒ Pressurized Pipe Flow

Measure more than one source? ☐ Yes ☒ No If yes, please provide a list of all the sources that share a common measuring device (ex. two wells or two pumped diversions):

Meter Type (ex. magnetic, propeller, flume, etc.): PROPELLER

Brand: BADGER Model No.:

Serial No.: 94191747 Units of Measure (gal, cfs, or ac-ft): GAL

Device Roll-Over No.: 99,999,999 Device Multiplier (ex. X100, X0.01): 100

Date Installed/Calibrated: 1994 Fish screen for surface water diversion? ☐ Yes ☐ No

LOCATION OF THE MEASURING DEVICE:

Section: 36 Township: 19 Range: 1W (¼): (¼¼):

Latitude (optional): 47° 05. 31N Longitude (optional):
(NAD 83 Datum in Decimal Degrees preferred)

Is meter within 100 feet of the point of diversion or withdrawal? ☒ Yes ☐ No

COMMENTS:

I hereby certify that all information reported on this form is correct to the best of my knowledge.

Printed Name: RICK HANCOCK Phone No.: (360) 459 0513

Address: 8383 VICWOOD LANE NE City: LACEY State: WA

E-mail: RICKH@HAWKSPRAIRIEGOLF.COM

Signature: Rick Hancock Date: 12/10/2010

G2-28489

DEPARTMENT OF ECOLOGY
State of Washington

Water Resources Program

FORM 1 – Measuring Device Information

Please fill out one form for each measuring device.

WATER RIGHT HOLDER(S):	WATER RIGHT DOCUMENT NO(S):
Name(s)	**Certificate, Permit, Claim, or Court Claim**

User's name for diversion/withdrawal point: WELL #2 WOODLANDS (ex. Well #1, Blue well house) ABH 211

ABOUT THE MEASURING DEVICE:

Please include an up-close photo of the face of the meter.

Flow Type: ☐ Open Channel Flow ☒ Pressurized Pipe Flow

Measure more than one source? ☐ Yes ☒ No If yes, please provide a list of all the sources that share a common measuring device (ex. two wells or two pumped diversions):

Meter Type (ex. magnetic, propeller, flume, etc.): PROPELLER

Brand: BADGER Model No.:

Serial No.: 94191746 Units of Measure (gal, cfs, or ac-ft): GAL

Device Roll-Over No.: 99,999,999 Device Multiplier (ex. X100, X0.01): 100

Date Installed/Calibrated: 1994 Fish screen for surface water diversion? ☐ Yes ☒ No

LOCATION OF THE MEASURING DEVICE:

Section: 36 Township: 19 Range: 1W (¼): (¼¼):

Latitude (optional): 47° 05 24.2N Longitude (optional):
(NAD 83 Datum in Decimal Degrees preferred)

Is meter within 100 feet of the point of diversion or withdrawal? ☒ Yes ☐ No

COMMENTS:

I hereby certify that all information reported on this form is correct to the best of my knowledge.

Printed Name: RICK HANCOCK Phone No.: (360) 459-0313

Address: 8383 VICWOOD LANE NE City: LACEY State: WA

E-mail: RICKH@HAWKSPRAIRIEGOLF.COM

Signature: Rick Hancock Date: 12/10/2010

G2-28489

Woodlands

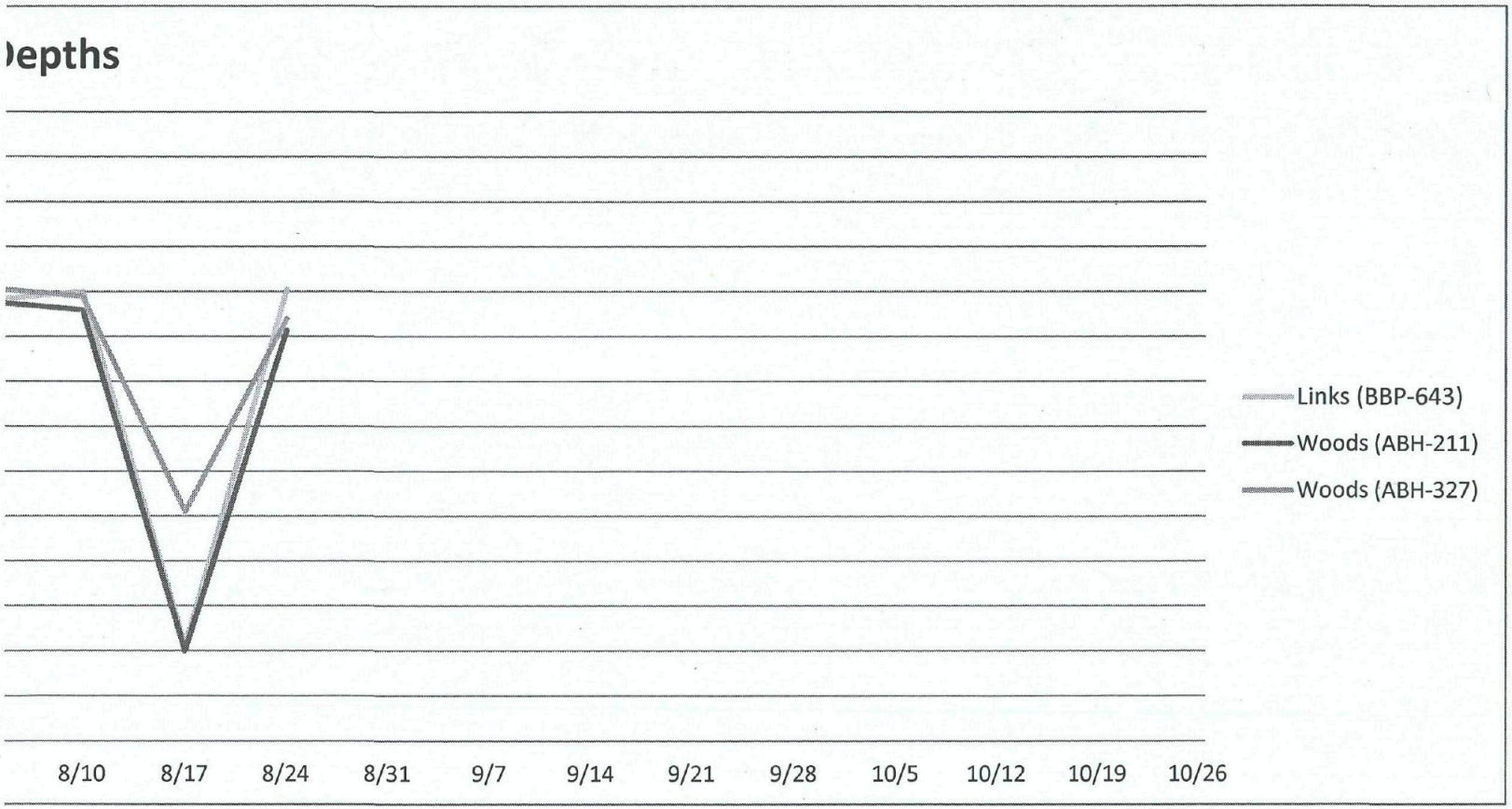
SWLs (mp) (btoc)

ABH-211				ABH-327	
Meter (Gallons)	Pump On/Off	Date	Level (feet)	Meter (Gallons)	Pump On/Off
-	-	5/4/12	218.0	-	-
80,945,400	Off	5/11/12	217.8	94,161,900	Off
81,450,600	Off	5/18/12	219.0	94,574,400	Off
81,858,300	Off	5/25/12	217.5	94,574,400	Off
82,412,900	On	6/1/12	220.1	95,116,700	Off
82,416,900	Off	6/8/12	217.5	95,116,700	Off
82,416,900	Off	6/15/12	217.7	95,116,700	Off
82,923,000	Off	6/22/12	219.0	95,521,900	Off
83,057,300	Off	6/29/12	218.5	95,617,900	Off
83,310,600	On	7/6/12	244.0 pumping	95,789,100	On
84,531,300	Off	7/13/12	222.6	96,762,500	Off
85,243,100	Off	7/20/12	224.9	97,204,100	Off
85,947,800	On	7/27/12	245.0 pumping	97,762,500	On
86,890,800	Off	8/3/12	219.5	98,512,000	Off
88,122,700	Off	8/10/12	220.5	99,488,700	Off
89,271,200	On	8/17/12	244.5 pumping	100,383,500	On
90,188,500	Off	8/24/12	223.0	101,093,800	Off
		8/31/12			
		9/7/12			
		9/14/12			
		9/21/12			
		9/28/12			
		10/5/12			
		10/12/12			
		10/19/12			
		10/26/12			
		11/2/12			
		11/9/12			
		11/16/12			
		11/23/12			

(Casing height is 3.2 feet)

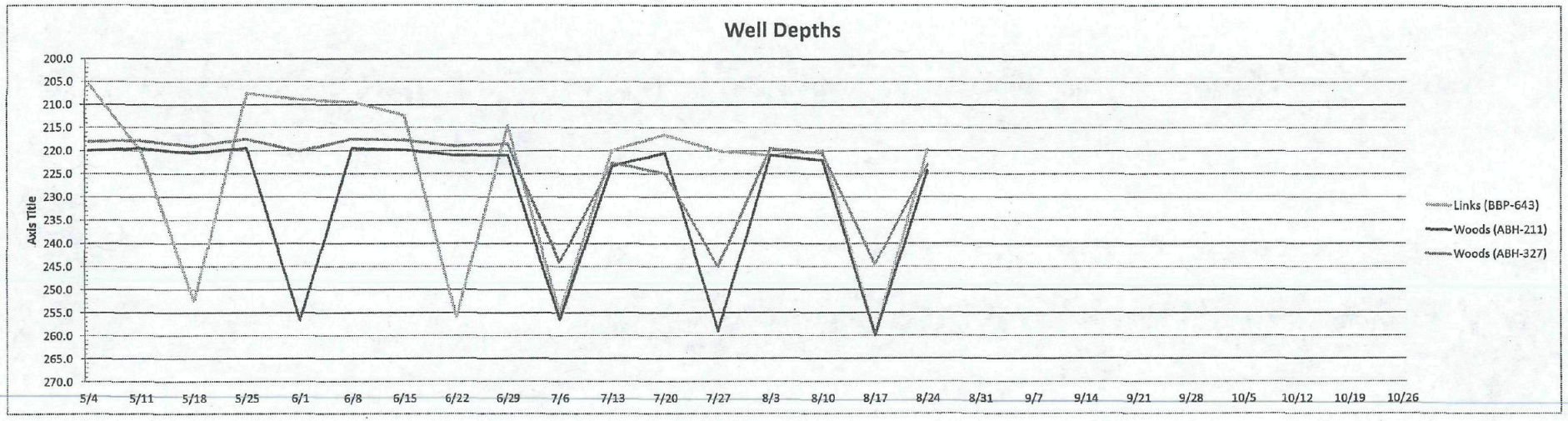
SWL data consistent with previous years

		11/30/12			
		12/7/12			
		12/14/12			
		12/21/12			
		12/28/12			
9,243,100				6,931,900	



Woodlands Irrigation Usage in Gallons
G2-28489

Month	2007	2008	2009	2010	2011
January	0	0	0	0	0
February	0	0	0	142,000	0
March	0	0	0	0	0
April	0	51,000	720,000	7,000	25,000
May	3,330,000	2,683,000	2,168,000	37,000	21,000
June	7,085,000	5,256,000	8,116,000	620,000	3,707,000
July	7,772,000	10,611,000	11,889,000	7,385,000	5,575,000
August	6,167,000	4,252,000	6,363,000	6,989,000	6,099,000
September	2,117,000	4,952,000	4,111,000	2,260,000	2,840,000
October	82,000	104,000	536,000	55,000	35,000
November	0	54,000	0	0	0
December	0	0	0	0	0
Totals	26,553,000	27,963,000	33,903,000	17,495,000	18,302,000
	81.5 AF	85.8 AF	104.0 AF	53.7 AF	56.2 AF



"swl" Valleys are not "static" levels
– well was pumping

→ data compared with previous years
swls are consistent / appear to be stable

mp

SWL data Graph

ESA Adolfson

5309 Shilshole Avenue NW
Suite 200
Seattle, WA 98107
206.789.9658 phone
206.789.9684 fax

www.adolfson.com

October 15, 2009

Mr. Glenn Hirai
Oki Golf
1416 – 112th Avenue NE
Bellevue, WA 98004

RE: Hawks Prairie Golf Course Monitoring Results – Woodlands Course

Dear Glenn:

As requested, ESA Adolfson (Adolfson) has continued to conduct monthly ground water level monitoring throughout 2009, as well as chloride monitoring during the months of April and August from the two wells located at the Woodlands Course of the Golf Club at Hawks Prairie in Lacey, Washington.

Per our agreement, we began collecting monthly water levels in August 2007. In a letter dated October 13, 2008, we reported on monthly water levels recorded and chloride sample results through September 2008.

We have continued to collect monthly water levels throughout the remainder of 2008 and through September 2009. Water levels were collected using an electronic water level indicator, measured to the nearest 0.1 foot. Water levels are presented both as the raw number measured in the field at the top of the well casing, and the calculation of the depth below ground surface. In the case of well ABH 211, the top of the well casing is located 3.2 feet above grade. In the case of ABH 327, the top of the well casing is located 2.5 feet above grade.

Also per our agreement, we attempted collection of chloride samples from the wells in April and August of this year. We collected samples in April, however were unable to collect samples in August due to an issue with starting the well pumps at that time. We did, however, collect chloride samples for both Woodlands Course wells in September of this year. The chloride samples were collected in the field and analyzed by Aquatic Research in Seattle. Copies of the laboratory results are attached for your reference.

The attached tables provide a summary of the water levels and chloride monitoring results collected for each well for the 2009 monitoring season. The results are well below the action level of 100 mg/L for chloride, and are consistent with the data collected in 2007 and 2008. Per your permit requirements, a copy of these results should be submitted to the Washington State Department of Ecology by October 15th of this year.

ESA Adolfson

Please don't hesitate to call if you have any questions or require additional information. We are scheduled to continue monitoring water levels on a monthly basis, and collect chloride samples from these two wells in April and August of 2010.

Very truly yours,

Lisa Adolfson
Senior Project Manager
ESA Adolfson

Attachments: Summary tables
Laboratory data

Hawks Prairie Golf Course

Well 2

Hawks Prairie Course Well Number ABH 211

Date	btoc Water Level Measurement*	Calculated depth below ground surface (-3.2 feet)	Pump Status	Chloride concentration (mg/L)
10/31/2008	225.5	222.3	not running	
11/19/2008	256.0	252.8	running	
12/11/2008	223.4	220.2	not running	
1/21/2009	224.7	221.5	not running	
2/23/2009	224.5	221.3	not running	
3/12/2009	225.0	221.8	not running	
4/14/2009	224.6	221.4	not running	15.7
5/13/2009	224.5	221.3	not running	
6/11/2009	225.0	221.8	not running	
7/22/2009	253.4	250.2	running	
8/13/2009	226.7	223.5	not running	
9/30/2009	225.8	222.6	not running	8.41

well pumping →

pumping →

*Water levels are measured from the top of the above ground well casing. This location is 3.2 feet above ground surface.

Well #1

Hawks Prairie Golf Course
Hawks Prairie Course Well Number ABH 327

Date	btoc Water Level Measurement*	Calculated depth below ground surface (-2.5 feet)	Pump Status	Chloride concentration (mg/L)
10/31/2008	222.9	220.4	not running	
11/19/2008	245.6	243.1	running	
12/11/2008	223.4	220.9	not running	
1/21/2009	222.5	220.0	not running	
2/23/2009	222.3	219.8	not running	
3/12/2009	222.9	220.4	not running	
4/14/2009	222.4	219.9	not running	5.96
5/13/2009	222.0	219.5	not running	
6/11/2009	222.6	220.1	not running	
7/22/2009	249.5	247.0	running	
8/13/2009	224.6	222.1	not running	
9/30/2009	223.8	221.3	not running	8.41

well pumping →

pumping →

*Water levels are measured from the top of the above ground well casing. This location is 2.5 feet above ground surface.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-65**	**PAGE 1**	
REPORT DATE:	**04/28/09**		
DATE SAMPLED:	**04/14/09**	**DATE RECEIVED:**	**04/15/09**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	CHLORIDE (mg/l)
LINKS WELL	1.76
327 WELL	5.96
211 WELL	15.7

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-65**	**PAGE 2**	
REPORT DATE:	**04/28/09**		
DATE SAMPLED:	**04/14/09**	**DATE RECEIVED:**	**04/15/09**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

QA/QC DATA

QC PARAMETER	CHLORIDE (mg/l)
METHOD	SM18 4500CLC
DATE ANALYZED	04/28/09
DETECTION LIMIT	0.50
DUPLICATE	
SAMPLE ID	BATCH
ORIGINAL	8.41
DUPLICATE	8.31
RPD	1.17%
SPIKE SAMPLE	
SAMPLE ID	BATCH
ORIGINAL	8.41
SPIKED SAMPLE	18.4
SPIKE ADDED	10.0
% RECOVERY	99.71%
QC CHECK	
FOUND	28.9
TRUE	30.0
% RECOVERY	96.45%
BLANK	<0.50

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Steven Lazoff
Laboratory Director

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-67**	**PAGE 1**	
REPORT DATE:	**10/07/09**		
DATE SAMPLED:	**09/30/09**	**DATE RECEIVED:**	**10/05/09**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	CHLORIDE (mg/l)
WELL 327	8.41
WELL 211	8.41

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-67**	**PAGE 2**	
REPORT DATE:	**10/07/09**		
DATE SAMPLED:	**09/30/09**	**DATE RECEIVED:**	**10/05/09**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

QA/QC DATA

QC PARAMETER	CHLORIDE (mg/l)
METHOD	SM18 4500CLC
DATE ANALYZED	10/05/09
DETECTION LIMIT	0.50
DUPLICATE	
SAMPLE ID	BATCH
ORIGINAL	5.47
DUPLICATE	5.18
RPD	5.50%
SPIKE SAMPLE	
SAMPLE ID	BATCH
ORIGINAL	5.47
SPIKED SAMPLE	14.8
SPIKE ADDED	10.0
% RECOVERY	92.87%
QC CHECK	
FOUND	28.4
TRUE	30.0
% RECOVERY	94.82%
BLANK	<0.50

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TO LOW RELATIVE TO SAMPLE CONCENTRATIO

SUBMITTED BY:

Steven Lazoff
Laboratory Director

Woods

Hawks Prairie Golf Course
Hawks Prairie Course Well Number ABH 211

Date	Water Level Measurement*	Calculated depth below ground surface (-3.2 feet)	Pump Status	Chloride concentration (mg/L)
1/29/2008	222.2	219	not running	
2/27/2008	221.1	217.9	not running	
3/25/2008	221.9	218.7	not running	
4/24/2008	253.9	250.7	running	9.68
5/22/2008	222.3	219.1	not running	
6/19/2008	224.8	221.6	not running	
7/31/2008	224.6	221.4	not running	
8/29/2008	225.3	222.1	not running	21
9/30/2008	225.4	222.2	not running	

*Water levels are measured from the top of the above ground well casing. This location is 3.2 feet

Hawks Prairie Woods Golf Course

Hawks Prairie Course Well Number ABH 327

Date	Water Level Measurement*	Calculated depth below ground surface (-3.2 feet)	Pump Status	Chloride concentration (mg/L)
1/29/2008	220.2	217.7	not running	
2/27/2008	220	217.5	not running	
3/25/2008	220	217.5	not running	
4/24/2008	242.4	239.9	running	3.81
5/22/2008	220.2	217.7	not running	
6/19/2008	222.7	220.2	not running	
7/31/2008	222.3	219.8	not running	
8/29/2008	223.2	220.7	not running	17.8
9/30/2008	223.3	220.8	not running	

*Water levels are measured from the top of the above ground well casing. This location is 2.5 feet above ground surface.

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-60**	**PAGE 1**	
REPORT DATE:	**05/08/08**		
DATE SAMPLED:	**04/24/08**	**DATE RECEIVED:**	**04/24/08**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

CASE NARRATIVE

Two water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	CHLORIDE (mg/l)
WELL ABH 211	9.68
WELL ABH 327	3.81

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-60**	**PAGE 2**	
REPORT DATE:	**05/08/08**		
DATE SAMPLED:	**04/24/08**	**DATE RECEIVED:**	**04/24/08**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

QA/QC DATA

QC PARAMETER	CHLORIDE (mg/l)
METHOD	SM18 4500CLC
DATE ANALYZED	05/08/08
DETECTION LIMIT	0.50
DUPLICATE	
SAMPLE ID	BATCH
ORIGINAL	42.3
DUPLICATE	42.7
RPD	0.92%
SPIKE SAMPLE	
SAMPLE ID	BATCH
ORIGINAL	42.3
SPIKED SAMPLE	52.2
SPIKE ADDED	10.0
% RECOVERY	98.73%
QC CHECK	
FOUND	28.3
TRUE	30.0
% RECOVERY	94.17%
BLANK	<0.50

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TO LOW RELATIVE TO SAMPLE CONCENTRATION.

3MITTED BY:

Steven Lazoff
Laboratory Director

HVL001-00

Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

CHAIN-OF-CUSTODY RECORD

CLIENT: ESA Adolfson - Lisa Adolfson
SAMPLING DATE: 4/24/08
SAMPLERS: AARON Booy

SHEET ____ OF ____
PROJECT ID: Hawks Prairie
CASE FILE NO.:
DATA RECORDED BY:

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	Chloride	BOTT #	NOTES
Well ABH 211	4/24 2:10pm	✓		
Well ABH 327	4/24 2:23pm	✓		

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name	AARON Booy		S. NIELSON	4/24/08 1630
Signature	[signature]		[signature]	
Affiliation	ESA Adolfson		ARI	

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name				
Signature				
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.):

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-62**	**PAGE 1**	
REPORT DATE:	**09/13/08**		
DATE SAMPLED:	**08/28/08**	**DATE RECEIVED:**	**08/29/08**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

CASE NARRATIVE

Three water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	CHLORIDE (mg/l)
ABH 211	21.0
ABH 327	17.8
LINKS COURSE	1.86

AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	**ADL001-62**	**PAGE 2**	
REPORT DATE:	**09/13/08**		
DATE SAMPLED:	**08/28/08**	**DATE RECEIVED:**	**08/29/08**

FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER SAMPLES FROM ADOLFSEN ASSOCIATES

QA/QC DATA

QC PARAMETER	CHLORIDE (mg/l)
METHOD	SM18 4500CLC
DATE ANALYZED	09/12/08
DETECTION LIMIT	0.50
DUPLICATE	
SAMPLE ID	BATCH
ORIGINAL	6.55
DUPLICATE	6.35
RPD	3.03%
SPIKE SAMPLE	
SAMPLE ID	BATCH
ORIGINAL	6.55
SPIKED SAMPLE	16.2
SPIKE ADDED	10.0
% RECOVERY	96.78%
QC CHECK	
FOUND	28.4
TRUE	30.0
% RECOVERY	94.82%
BLANK	<0.50

RPD = RELATIVE PERCENT DIFFERENCE.
NA = NOT APPLICABLE OR NOT AVAILABLE.
NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Steven Lazoff
Laboratory Director

MDL001-62.

Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

CHAIN-OF-CUSTODY RECORD

CLIENT: ESA Adolfson

SAMPLING DATE: 8/28/2008

SAMPLERS: Aaron Booy + Scott Olmsted

SHEET _____ OF _____

PROJECT ID: _____

CASE FILE NO.: _____

DATA RECORDED BY: _____

SAMPLE INFORMATION

SAMPLE ID	DATE/TIME COLLECTED	PARAMETERS: Chloride	BOTT #	NOTES
ABH 211	8/28 10:55am	X		
ABH 327	8/28 11:00am	X		
Links course	8/28 10:40am	X		

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name	Aaron Booy	8/29/08	SWANSON	8/29/08
Signature		9:45am		0934 S
Affiliation	ESA Adolfson		ARI	

	Relinquished By	Date/Time	Received By	Date/Time
Printed Name				
Signature				
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.): _____

Badger Meter

Recordall® Cold Water Top Load Bronze Disc Meter
Size 2" (DN 50mm)
NSF/ANSI Standard 61 Certified, Annex G

DESCRIPTION

Badger Meter offers the Recordall Disc meter in Cast Bronze and a Lead-Free Alloy. The Lead-Free Alloy (Trade designation: M170-LL) version has been certified to comply with NSF/ANSI Standard 61, Annex G and carries the NSF-61 Mark on the housing. All components of the Lead-Free Alloy meter, i.e., disc, chamber, housing, seals, etc. comprise the certified system.

APPLICATIONS: For use in measurement of potable cold water in residential, commercial and industrial services where flow is in one direction only.

OPERATION: Water flows through the meter's strainer and into the measuring chamber where it causes the disc to nutate. The disc, which moves freely, nutates on its own ball, guided by a thrust roller. A drive magnet transmits the motion of the disc to a follower magnet located within the permanently-sealed register. The follower magnet is connected to the register gear train. The gear train reduces the disc nutations into volume totalization units displayed on the register dial face.

OPERATING PERFORMANCE: The Badger Meter Recordall Disc meters meet or exceed registration accuracy for the low flow rates (95%), normal operating flow rates (100 ± 1.5%), and maximum continuous operation flow rates as specifically stated by AWWA Standard C700.

CONSTRUCTION: Badger Meter Recordall Disc meter construction, which complies with ANSI/AWWA standard C700, consists of three basic components: bronze meter housing, measuring chamber, and permanently, sealed register. A corrosion-resistant engineered polymer material is used for the measuring chamber.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters also minimizes spare parts inventory investment. The built-in strainer has an effective straining area of twice the inlet size.

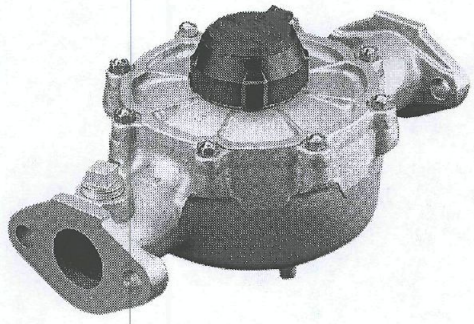
MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading, odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating engineered polymer gears to minimize friction and provides long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading systems are available for all Recordall Disc meters. All reading options are removable from the meter without disrupting water service.

TAMPER-PROOF FEATURES: Customer removal of the register to obtain free water can be prevented when the optional tamper detection seal wire screw/or Torx® tamper seal resistant screw is added to the meter. Both can be installed at the meter site or at the factory.

MAINTENANCE: Badger Meter Recordall Disc meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger Meter offers various maintenance and meter component exchange programs to fit the needs of the utility.

CONNECTIONS: Tailpieces/Flanges for installations of meters on various pipe types and sizes, including misaligned pipes, are available as an option.



Model 170 shown with optional 1" Test Plug

SPECIFICATIONS

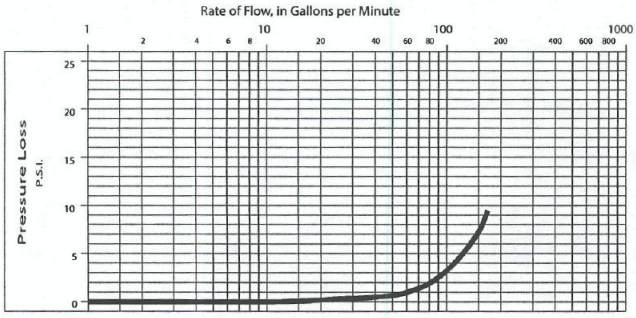
Typical Operating Range (100% ± 1.5%)	2 1/2 - 170 GPM (.57 to 39 m^3/hr)
Low Flow (Min. 95%)	1 1/2 GPM (.34 m^3/hr)
Maximum Continuous Operation	100 GPM (23 m^3/hr)
Pressure Loss at Maximum Continuous Operation	3.3 PSI at 100 GPM (.23 bar at 23 m^3/hr)
Maximum Operating Temperature	80°F (26°C)
Maximum Operating Pressure	150 PSI (10 bar)
Measuring Element	Nutating disc, positive displacement
Register Type	Straight reading, permanently sealed magnetic drive standard. Remote reading or Automatic Meter Reading units optional.
Registration	100 Gallons, 10 Cubic Feet, 1 m^3
Register Capacity	100,000,000 Gallons, 10,000,000 Cubic Feet, 1,000,000 m^3. 6 odometer wheels.
Meter Connections	2" AWWA two bolt elliptical flange, drilled, or 2" - 11 1/2 NPT internal pipe threads.
Optional Test Plug	1" NPT test plug (TP) available on elliptical long and short versions.

MATERIALS

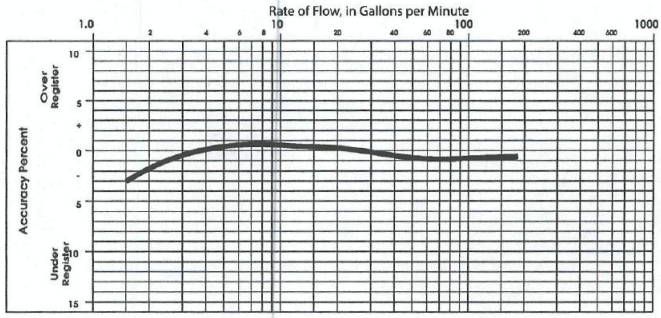
Meter Housing	Cast Bronze, Lead-Free Alloy
Housing Top Plates	Bronze, Lead-Free Alloy
Measuring Chamber	Engineered Polymer
Disc	Engineered Polymer
Trim	Stainless Steel/Bronze
Strainer	Engineered Polymer
Disc Spindle	*Stainless Steel*
Magnet	Ceramic
Magnet Spindle	Stainless Steel
Register Lid and Box	Engineered Polymer or Bronze
Generator Housing	Engineered Polymer

Technical Brief

PRESSURE LOSS CHART



ACCURACY CHART

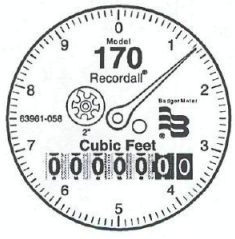


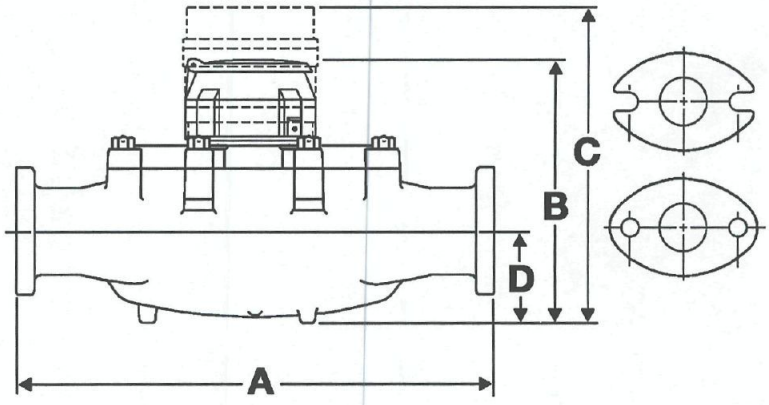
METER SIZE	METER MODEL	A LAYING LENGTH	B HEIGHT REG./RTR	C HEIGHT GEN.	D CENTERLINE BASE	WIDTH	APPROX. SHIPPING WEIGHT
2" (50mm)	170 EL, Hex. 170 EL, TP	15 1/4" (387mm)	8" (203mm)	9 3/8" (238mm)	2 7/8" (73mm)	9 1/2" (241mm)	30 lb. (13.6kg)
2" (50mm)	170 ELL, 170 ELL, TP	17" (432mm)	8" (203mm)	9 3/8" (238mm)	2 7/8" (73mm)	9 1/2" (241mm)	30 lb. (13.6kg)

EL = Elliptical ELL = Elliptical Long Hex = Hexagon, 2" - 11 1/2 NPT Thread TP=Test Plug 1"

Sweep Hand Registration

MODEL	GALLON	CU.FT.	CU. METER
M170	100	10	1





Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists.

Badger Meter | P.O. Box 245036, Milwaukee, Wisconsin 53224-9536
800-876-3837 | infocentral@badgermeter.com | www.badgermeter.com

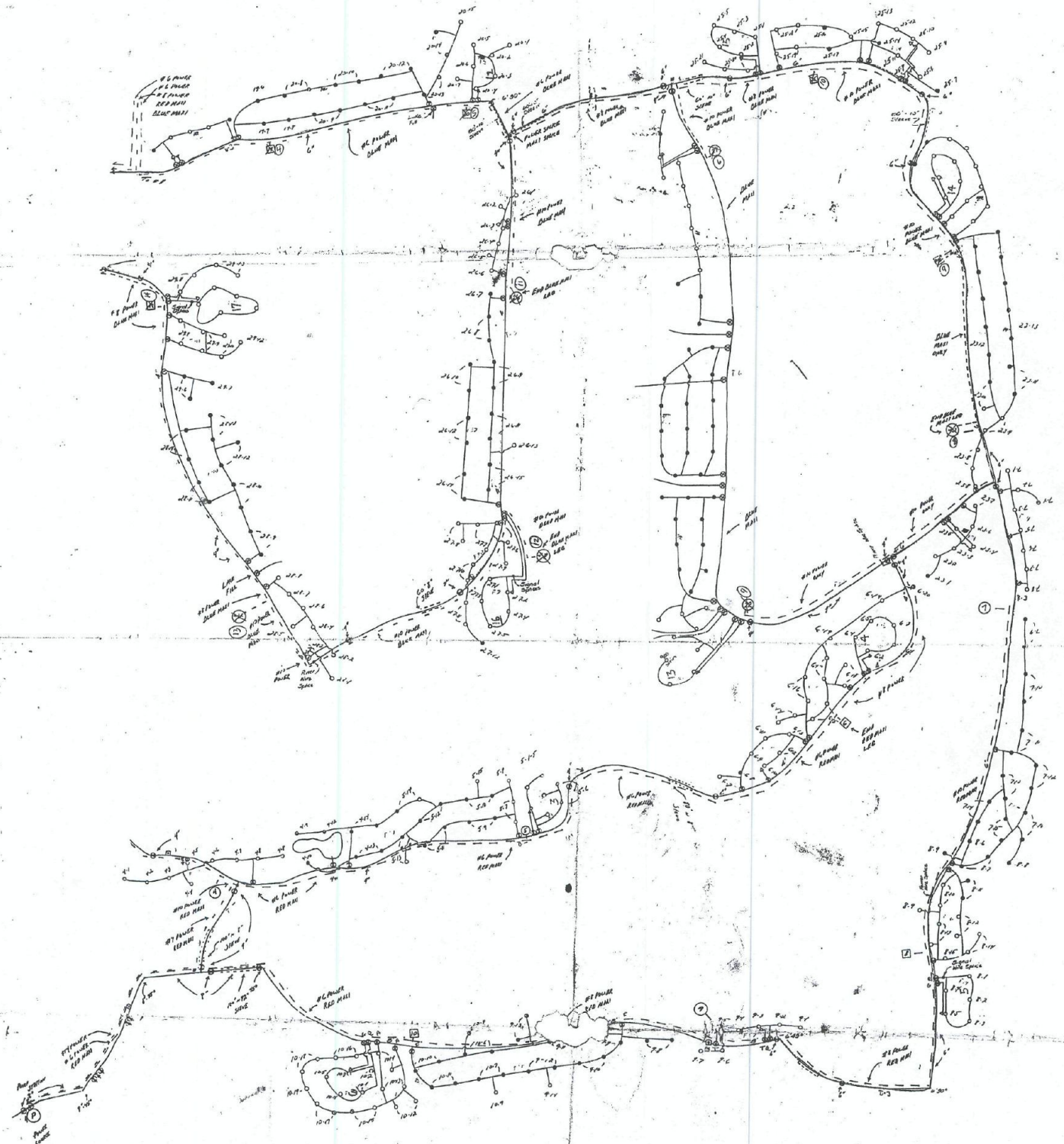
MERRIWOOD GOLF COURSE
LACEY, WASHINGTON

AS BUILT DRAWINGS

DATE July '94'
SCALE 1"=100'

BY A&F INC.
TULLAHOMA, TENNESSEE

Schematic Golf Irrigation Layout



Legend
- Rain Bird Eagle 700 #18 Nozzle (Yellow)
- Rain Bird Eagle 750 #18 Nozzle (Yellow)
- Rain Bird Eagle 900 #28 Nozzle (Green)
- Rain Bird Eagle 950 #28 Nozzle (Green)
- Rain Bird 5RC Quick Coupling Valve
- Pressure Reducing Valve
- Main Line Isolation Valve
- Lateral Line Isolation Valve
- Air Release/Vacumn Relief Valve
- P.V.C. Pipe W/ Size As Noted; Lateral Lines 2" Unless Otherwise Noted
- Existing
- Splice Point

WEEP WOOD GOLF COURSE
LACEY, WASHINGTON

'AS BUILT' DRAWINGS

DATE: 7 JULY 94'
SCALE: 1"=100'

BY: A & F, INC.
TULLAHOMA, TENNESSEE